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Editorial.

A SOUTH AFRICAN VETERINARY PROBLEM.—URGENT NEED FOR IMMEDIATE ACTION.

In the latest issue to hand of that excellent publication, *The Agricultural Journal of the Union of South Africa*, we note an article on "East Coast Fever and its Eradication," which leaves rather a disturbing impression on the minds of those of us at home who thought that this destructive malady had been, if not eliminated, at least efficiently controlled. The article in question—which, being from an official source, reflects the true state of affairs—commences: "The position with regard to East Coast Fever is very serious, particularly in parts of the Transvaal and Natal, and unless a special effort is made the position may well become more serious."

Such a state of affairs is rendered more significant when one recalls the present troublous times which South Africa is experiencing in matters industrial.

Any adjustment of her labour difficulties, however, still leaves the larger ultimate question of this fair country's well-being unsolved, for the gold and diamond industry, which maintains so many thousands of her industrial workers to-day, forms no basis of permanent prosperity. Already we read of once-important mines closing down from being worked out, or abandoned as having become no longer profitable. Gibbon truly says, in his "Rise and Fall of the Roman Empire," that "All taxes must at last fall upon Agriculture," an axiom which every student of political economy endorses, recognising that the ultimate welfare of any country and the stability of any state lies primarily and essentially in its capacity for husbandry. It is the recognition of such a basic principle that forces one to view seriously

the present state of affairs in Natal and the Transvaal, as reflected in the quotation above from the Union agricultural journal. We can well understand that prospective settlers and investors are hesitating before embarking their fortunes in a country which is a prey—not to labour difficulties, for these we have always with us—but to a devastating and chronic cattle disease, eroding the essential wealth of the land much as a slow-growing neoplasm gradually saps the strength of an individual. Readers will judge whether we over-estimate the seriousness of the matter when we quote the following extract from a series of able articles on East Coast Fever appearing recently in the *Natal and Free State Press.* The writer says: "I do not think I should be taking an outside figure when I compute that the disease has cost South Africa a total of at least forty million pounds," and this estimate he arrives at without any attempt to compute the indirect losses from the disease. In speaking of Natal the same writer computes the loss as "approximately fifteen million pounds in sixteen years." Two of the witnesses before the recent Senatorial Committee of Enquiry into East Coast Fever stated that in their district alone the loss amounted to "one million pounds," etc.

Such figures and facts, we think, will serve to acquit us of the charge of being alarmist or of over-estimating the significance of the agricultural journal's statement that "the position with regard to East Coast Fever is very serious."

We must also acquit ourselves in anticipation of the charge that we are concerning ourselves with affairs outside our province, for the question is essentially veterinary in its nature; and, whether we like it or not, one which involves our corporate reputation, throwing us as a profession strongly into relief against the background of public opinion.

The official article we have quoted speaks of the volume of public criticism which has to be sustained by the Veterinary Division of the Union Government, and we may at once say from our own knowledge that much of such criticism is ill-informed and wrongly directed. If, with Hamlet, the Department concerned can say "It touches us not, let the galled jade wince, our withers are unwrung," so much the better for its departmental peace of mind.

Where, however, there is doubt as to present soundness of policy of repression or recognition of past errors of administration, no room for complacency then exists, and—reading between the lines—this latter, we judge, is the case in the present instance.

Ten years ago the disease in question seemed upon the point of extinction. By three years of laborious research, that able and brilliant administrator, Watkins Pitchford, of Natal, whom our profession is

proud to own as a colleague and whose name is a household word amongst veterinary workers all over the world, had shown—with a wealth of precise scientific detail—how the disease could be eradicated rapidly and permanently. He devised a key to the lock which previous workers had long tried to fashion, and before he left South Africa he had the satisfaction of seeing the disease eradicated throughout large areas, and thousands of acres of rich grass-land again rendered safe for grazing. Unfortunately for South Africa, his findings were not —as a prominent stock-owner said—"fool-proof," inasmuch as they were capable of being misinterpreted and misapplied by those who found exact compliance with instructions irksome, and sought a line of their own of less resistance and less trouble. To use the same metaphor of the key, it was as if those into whose hands it was entrusted had reasons for not approving the design of its wards, and in order to "go one better," as we say, had altered the pattern of the key and expected it still to turn the lock. That Pitchford had foreseen the danger of exactly such an attempt is evident, for his reports contain specific warnings against any attempts to alter the precise, but practical and easy conditions he laid down.

This, in brief, is the reason for South Africa's present trouble.

In no system of disease-repression which we can recall to mind has the remedy been adapted to the disease with so great a precision and aptness as in the case of East Coast Fever, and any deviation, either in point of time or material, from the exact conditions laid down is liable to be attended by failure. This is abundantly plain to anyone taking the trouble to follow Pitchford's work through the many pages of his reports, and yet this vital point is even now missed by the official article, which bewails the continuance of the disease. Produced by the tick, the remedy devised depends upon the destruction of the tick in a dipping-fluid, the exact composition of which is of vital importance, inasmuch as its component parts are adapted to the varying phases of the life-history of the tick, thus permitting of no escape. In the article in question, such points as the arsenical strength of the fluid, the intervals of dipping, and the thoroughness of immersion, etc., are all officially emphasised by the writer, but the main and paramount point, the *composition* of the dipping-fluid—a point which took years to arrange satisfactorily—is not even referred to, and has been consistently evaded, not by reason of any practical difficulty attending its use, but rather on account of the departmental expediency which seeks to save the farmer a little trouble, but in doing so, involves him in an infinitely greater trouble, and a perpetual menace. This deviation from Pitchford's findings, this hampering of the lock, is discreetly omitted from the writer's essential points!

Lest we should be thought to have over-stated the case, we quote the following finding of the recent Select Committee of Enquiry of the Union Senate: "The evidence before your Committee has the outstanding feature of furnishing overwhelming proof of the efficacy of the dipping *as recommended by Col. Watkins-Pitchford* (the italics are ours) as being the *only* antidote to effect the eventual eradication of the disease." Commenting in the South African Press on this finding, one of South Africa's prominent agriculturists says, "Well, ten years after Col. Pitchford's report appeared, the recommendations have not been carried out. No effort has been made by the Government to place the information before the farmer, and the Veterinary Department has done nothing to promulgate Pitchford's advice. I do not believe the Report has even been printed in Dutch, and like almost all the extremely valuable work done by Col. Watkins-Pitchford, it has been pigeon-holed through professional jealousy." The Senate findings re-echo the same note when they say "Jealousy in the higher ranks of the Public Service entrusted with combating the disease has made the administration of the East Coast Fever regulations in some parts of the Union a rope of sand." Were not such incontrovertible evidence of the cause of failure forthcoming, we should refrain both from comment and counsel. We cast no reflection upon the Veterinary profession in South Africa, which has sustained our credit in an eminent degree in the past, nor do we presume to offer advice to the "man on the spot." Outsiders, however, proverbially, "see most of the fight," and we venture to suggest, in view of the seriousness of the situation, that not only is responsibility lightened, but the public interest is more likely to be served by the strictest adherence to the scientific findings of one of our own profession, who speaks only after full knowledge.

Pitchford's exhaustive work has hitherto remained unchallenged even by his rivals, both as to its accuracy of observation and as to its immense potentialities for good in the eradication of one of the worst cattle-plagues known to veterinary science. These facts, we think, should warrant the fullest official confidence and adoption in the present serious crisis, and it seems incomprehensible that a method which had given such phenomenal success after such a comparatively short trial should not have been continued. In fact, one wonders why the agriculturists do not rise in a body and demand it before it gets too late, and they are ruined. After all, they are the people most vitally concerned, and it is up to them to see that they get attention. South Africa depends for its wealth and prosperity—in fact, for its very existence—upon its cattle and its agriculture, and research workers with the necessary brains to put their theories into practice in such a

way that the results are proved to be a success, are needed everywhere, quite as much in our profession as in any others, and when they are found, the neglect to follow their advice leads, as in this case, to loss and disaster. It seems incomprehensible why, in the face of the finding of the Select Committee of Enquiry, the methods first advised and carried out so successfully by our colleague, Col. Watkins-Pitchford, are not in vogue at the present time. Surely it seems proved beyond a doubt that had they been adopted years ago, the farmers of South Africa would have been hundreds of thousands of pounds in pocket, and it is for them to agitate until the matter is put right.

General Articles.

AN ACCOUNT OF THE CIRCUMSTANCES ASSOCIATED WITH AN OUTBREAK OF DISEASE AMONG MILCH COWS, HORSES, AND THEIR ATTENDANTS, BELIEVED TO BE OF THE NATURE OF "COW-POX," IN THE COUNTY OF SOMERSETSHIRE IN THE YEAR 1909, AND CONSIDERATIONS ARISING THEREFROM.*

By RICHARD J. REECE, C.B., M.D.

Vaccinia or Cow-pox.

The subject of diseases transmissible from animals to man has always been one of great interest to the student of preventive medicine. Vaccinia or cow-pox is one of these diseases; it occurs in the bovine as well as in other animals, and when inoculated into man it has the remarkable power, as discovered by Jenner, of protecting the inoculated person from the infection of small-pox. That small-pox and cow-pox are closely akin, and that the former can give rise to the latter cannot be disputed, and though cow-pox may occur in a pastoral district it is not easy at the present day to trace its origin to a previous case or cases of small-pox.

For the purposes of this paper, it will suffice to say that cow-pox is a specific eruptive disease of the vesicular order that affects cows. It is described by the early writers as "natural" cow-pox and "casual" cow-pox, according to whether the infection of the disease is acquired by the cow in a natural way as opposed to direct transference of infection from cow to cow by unintentional inoculation by the milkers. Apparently Jenner himself at first thought the disease in the cow was derived from a disease of the horse, the so-called "grease," and that the infection was transmitted from the horse to the cow probably

*By permission of the Editor of the Proceedings of the Royal Society of Medicine.

by men who were attendants on both animals. Later Jenner recognised that this eruptive disease of the horse when communicated to man was capable of affording protection against attack by small-pox even though it had never passed through the cow.

That persons suffering from small-pox could communicate infection to cows was early known. Dr. Waterhouse, of Cambridge, Massachusetts, in a letter to Jenner, wrote * :—

" At one of our periodical inoculations (*i.e.*, for small-pox) which occur in New England once in eight or nine years, several people drove their cows to a hospital near a populous village, in order that their families might have the daily benefit of their milk. These cows were milked by persons in all stages of small-pox ; the consequence was the cows had an eruptive disorder on their teats and udders so like the small-pox that everyone in the hospital, as well as the physician who told me, declared the cows had the small-pox."

No inoculations, however, were performed with the virus from the cows.

Whether cows could be infected with the virus of small-pox otherwise than by direct inoculation formed the subject of investigation by Dr. Sonderland, of Bremen.† He covered cows with blankets taken from the bed of a patient who had died of small-pox, and hung such blankets up around the head of the animal, so that it must breathe the effluvia arising from them. In a few days the cows manifested symptoms of cow-pox, and lymph taken from them produced genuine vaccine vesicles in the human subject.

This work of Sonderland arrested the attention of Ceely, who, in 1838, commenced experiments to ascertain the possibility of infecting the cow with variola after the manner in which Sonderland had succeeded. He enveloped two milch cows and one heifer, all in calf, in the sheets and blankets that had been used by a small-pox patient, but without result.

Later, in 1840, Ceely met with a case of great interest, in which there was good ground for believing that the vaccine disease was induced in cows by " variolous effluvia." Eight milch cows and two stirks were turned out to graze during the day-time in a meadow at Oakley, in the Vale of Aylesbury, in which the clothes and bedding of a person who had died of malignant variola had previously been exposed almost constantly day and night for a week, and in which they were still always exposed at night, and not always removed in the morning before the readmission of the animals. On one occasion, at least, the cows were observed in the midst of the bed flock, licking

* *Trans. Prov. Med. and Surg. Assoc.* (Vaccination Section), viii, p. 23.
† *Med. Gaz.*, 1831, i, No. V, p. 162.

it up. Within twelve or fourteen days of their admission to the meadows, five of the milch cows and one stirk exhibited simultaneously, or almost simultaneously, well marked cow-pox. It was most clearly ascertained that the animals, which were animals belonging to the place and had not been brought in from elsewhere, were in good health at the time of their admission to the meadows, and that there was no vaccine disease at the time anywhere in the Vale. None of the milkers had sores on their hands, *except those which they subsequently got from these cows*; besides, one of the infected animals was a stirk. The simultaneous attack of the animals showed a *common cause*. Ceely states that, in the whole course of his experience, he never saw so many primary cases together in a dairy at one time, as on this occasion. The period of attack after the first exposure corresponds entirely with what might be anticipated if the common cause of the outbreak were " variolous effluvia."*

I have quoted this case somewhat fully as it is a record of the outbreak of cow-pox among cows which had been exposed to the infection of small-pox, and one point of special interest is that one of the affected animals was not a milch cow.

Ceely succeeded in his attempts to inoculate cows with lymph taken from casual cow-pox of the cow and with lymph obtained from the vesicles of vaccinated persons, and he offers the following observations :—

" There can be no doubt that the nearer we approach the practice of the ' best vaccinators of the cow '—the milkers—the more likely we are to succeed ; and although, if it were possible to employ a number of small-pox patients to milk cows when their teats are chapped and cracked, we should not meet with the success that attends the manifestations of the former with a native lymph, yet it would not be unreasonable to expect a larger measure of success by this than by any other mode."†

Again, commenting on the vaccination of the cow with primary lymph, he writes :—

" Although I could not boast of the almost unvarying success which attends the casual vaccination of the milkers, yet I found much less difficulty in succeeding or than is experienced in vaccinating these animals with lymph taken from man."

He adds as regards milkers :—

" These men, without knowing it, are unquestionably the most successful vaccinators with primary lymph, and the most careful too, for they never neglect Bryce's test. We cannot fail to be vexed

* *Trans. Prov. Med. and Surg. Assoc.*, x, pp. 211-225.
† *Ibid.*, viii, p. 399.

at their destructive proceedings, and impatient at their general lack of discrimination; but we must stop to admire the splendid success of their performances, which it would be well if we could imitate. They may indeed smile at our puny efforts."*

Nevertheless, I imagine that the method of the milkers would not commend itself to Dr. Blaxall, and that his success in the primary vaccination of calves is not less than theirs.

"The horse is subject, like the cow, to a specific eruptive fever, resulting in the development of a pock, the material of which has the same property as the fluid of cow-pox, of protecting the human system when inoculated with it, from small-pox. This pock has the outward appearance and the anatomical structure which distinguish the vesicles of cow-pox. The chief points in which the disease, as seen in the horse, differs from that in the cow, are (1) the locality of the eruption, which is chiefly on the heels, and on the naso-labial mucous membrane; (2) the tendency of the eruption in some cases to become *generalised* over the body; and (3) its appearance in the male as well as in the female, horses being subject to it as well as mares."†

Mr. Tanner, a veterinary surgeon at Rockhampton, so early as 1800, raised a perfect vaccine vesicle on the teat of a cow by first removing a scab from an accidental sore, and then rubbing over the sore with what he regarded as "grease." Lymph taken from the vesicle thus raised was successfully transferred to the human subject, and a stock of vaccine lymph thus obtained, some of which was sent to Jenner, and through him to the small-pox hospital. In the same year (1800) Lupton, of Thame, more correctly pointed out that the disease of the horse, which was analogous to cow-pox, and was communicable to the cow, was *not* "the grease," nor any form of grease, but a disease regarded by the farriers in his neighbourhood as widely different from it, and to which they gave the name of "scratchy heel." In 1801 Loy, of Pickering, distinguished two forms of grease, the acute and the chronic, and he regarded the acute form alone as capable of imparting the cow-pox to the cow or to man, and then only in case the matter were taken at the proper period of the vesicle. In France doubts as to the existence of genuine horse-pox were entertained until an outbreak of the disease occurred in horses at Rieumes, near Toulouse, in 1860, and another at Alfort in 1863, both of which gave rise to inoculations, with unequivocal results.

The infection of cow-pox, once introduced into a herd of milch cows, is spread from the cow first affected to other cows by the hands

* *Ibid.*, viii, pp. 352-353.

† "A Handbook of Vaccination," by Edward C. Seaton, M.D., 1868, p. 23.

of the milkers and only milch cows are affected. Ceely states that he had "frequently witnessed the fact that stirks, dry heifers, dry cows, and milch cows milked by other hands, grazing in the same pastures, feeding in the same sheds, and in contiguous stalls, remain exempt from the disease."

I am not aware of any record of one animal being affected by another at any institution where calf vaccine lymph is produced, except by direct inoculation.

Robert Cory, when alluding to the fact that the specific vesicles are produced on those parts of the bodies of the cow and horse which are mostly brought into contact with the hand of man, adds: "It thus seems likely that if cows were not milked, and horses were not shod, their respective variolous diseases would cease, as far as we can see, to exist." Dr. Theile, of Kasan, who in 1836 and 1838 succeeded in inoculating the cow with small-pox matter, came to the conclusion that "the so-called vaccine is not an eruptive disease peculiar to the cow, but is produced in it by the transmission of human small-pox to it; and the man and not the cow, as has hitherto been thought, is the source of the disease."

I am placing before you a short account of one of the three outbreaks of the year 1909, in which the disease occurred in milch cows, horses and their attendants.

In the second week of June, 1909, the Local Government Board, having learnt that milch cows at a dairy farm in the Frome Rural District were suffering from cow-pox, instructed me to investigate the matter, to ascertain, so far as practicable, to what extent the disease was, or had been, prevalent among the cows of the dairy farms in this part of the country and whether there was evidence that the outbreak of cow-pox in question had been directly related to antecedent small-pox in the human subject. Inquiries instituted by me in the Frome Rural, Frome Urban, Midsomer Norton Urban, Radstock Urban, Shepton Mallet Urban and Rural, Clutton Rural and Bath Rural Districts, showed that cow-pox had existed for some weeks previous to my visit and that it was widespread. In individual instances the disease appeared to have been imported into particular farms from places situated at a distance, *viz.*, Salisbury and Dorchester; but, adjoining or in the immediate neighbourhood of such farms, there were others in which cow-pox had occurred coincidently in time or at an earlier date. As already mentioned, cow maladies other than true cow-pox, or vaccinia, are characterised by eruptions on the teats and udders, and few farmers seem able to distinguish cow-pox from diseases simulating it. Although inquiry was made with patience and persistence, yet owing to the widespread cow-pox

in Somersetshire and the impracticability of determining with any degree of reliability the date of its first occurrence, it was found impossible to ascertain whether or not there was connection between cow-pox of the cow and small-pox of the human subject. In the City of Bristol and in its neighbourhood there had been an outbreak of small-pox at the end of 1908 and the beginning of 1909, and there had been an extension of the disease to Yeovil. The districts in which cow-pox occurred, with the single exception of Midsomer Norton Urban District, had been free from notified small-pox during many years.

In all, some fourteen farms suspected of cow-pox were visited within the wide area referred to, and only two were found to be free from suspicion of cow-pox. The number of milch cows examined at the farms was 410, and 214 of these were found either to have been

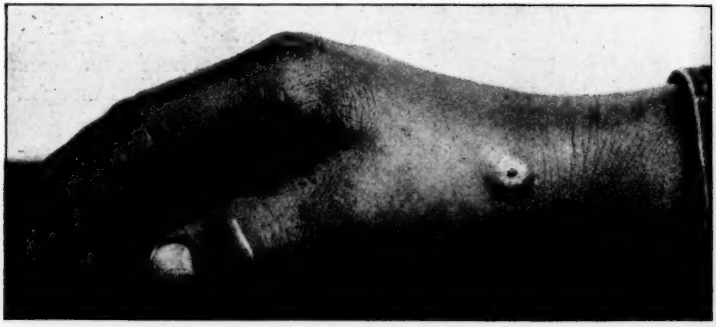

FIG. 1.—Photograph of the hand of a milker, Mrs. " K.," aged 49, showing inoculation of cow-pox, of about one week's duration. She stated she had been vaccinated when a baby, but showed no marks of vaccination.

attacked by distinct cow-pox or to have come under suspicion as suffering or as having recently suffered from that disease. The cows on the farms and the number of milkers varied considerably in number. Opportunity was not always afforded of examining every milker employed, but of forty-four milkers examined twenty-three were found to be suffering or to have recently suffered from cow-pox. In many of these cases there was a history of a previously abraded surface of the skin, such for instance as cuts by knife or saw, or prick by a thorn. In several cases there were secondary vesicles on hands and arms. Most of the milkers had been vaccinated in infancy, and of those unaffected on invaded farms several admitted having suffered attack by cow-pox on previous occasions, whilst others had been successfully revaccinated during the small-pox prevalence of 1901-2, or at a later date while serving in the Army. (Figs 1, 2.)

In this inquiry I had the advantage of the assistance of Dr. Blaxall, who visited some of the affected farms with me, and who subsequently made experiment with the material obtained from the affected animals on calves and rabbits at the Government Lymph Establishment. Certain facts of interest came under review, associated with our inquiry.

At one farm were three bulls, forty-seven cows, six cart horses and a pony. Five men and a boy were regularly employed there. One of these cows had been bought with her calf on May 4 at a depository at Salisbury. About May 12 the farmer noticed that this cow had sore teats. He had had no previous experience of cow-pox, and attributed the cow's condition to cracked or chapped teats. It was

FIG. 2.—Mrs. " K." Photograph taken twelve days later than preceding picture. The resulting scab is about to separate.

only when the milkers became infected that his attention was particularly directed to this Salisbury cow. At the time of my visit to this farm (June 16) all the cows in milk were or had been affected and were in all stages of cow-pox. Each of the five men, the boy, and the farmer became inoculated with cow-pox. On June 16 the farmer had a sore almost healed on the right index finger, and about June 9 his left eye had become inflamed, and the local medical practitioner told him his eye was inoculated with cow-pox. The farmer was disinclined to accept this explanation, but the deeper structures of the eyeball became inflamed and he was admitted to hospital for treatment. The result of the attack was that the sight of the eye was seriously affected. He had been re-vaccinated in 1901 or 1902. The boy, aged 16, who was half-witted, was employed on the farm to drive the pony and generally to look after it, and beyond carrying pails from the milking sheds to the dairy he had nothing to do with the

cows. This boy became ill on June 9 or thereabouts, with an inflamed eyelid. The first symptom he complained of was difficulty in swallowing, due apparently to enlarged glands at the angle of the jaw. When seen by me on June 16, the left upper eyelid was much swollen and deeply congested and œdematous (Fig. 3). The seat of inoculation was evidently at the outer canthus of the upper eyelid, and the boy's medical attendant informed me that the original sore closely resembled a re-vaccination mark. The boy had been vaccinated in infancy. On June 17 I examined the pony which was under the charge of the

FIG. 3.—Photograph of the boy "A" at "Z" farm taken about ten days after inoculation of the eyelid by either "cow-pox" or "horse-pox."

boy, and found that above the coronet on the hind legs there were small circular sores which were scabbed over. These extended above the fetlock, one leg being much more affected than the other. The sores were not many and were healing. The farmer was quite unaware that this pony had anything the matter with it. In the stall next to this pony was one of the farm horses. On examination I found this horse had a similar eruptive disease on both hind legs; small sores were discharging a yellow serous fluid into the long hair above the hoofs. The eruption extended from the coronet above the fetlock almost to the hock. The disease was acute, both legs were hot and swollen. The other horses were out at work and not available for inspection at that time, but the farmer examined them on their return

from work and found they were then unaffected. Later, certain of these horses became affected, and I had opportunity of examining them. The eruption was not limited to the hind legs; three of the horses had all four legs affected; but the eruption was much less extensive on the fore than on the hind legs. It did not extend above the hocks. The nasolabial mucous membrane was not seen to be affected, and the eruption was not generalised over the bodies of the animals. Owing to the lower part of the legs of the cart horses having long hair into which a viscid and yellowish serum or lymph had exuded copiously, matting it together, it was difficult to determine the exact nature of the eruption. Moreover, the irritation of the

FIG. 4.—Photograph of the udder of a cow on " Z " farm, showing cow-pox lesions, from scrapings of which typical vaccinia has been produced in calves by Dr. Blaxall at the Government Lymph Establishment.

eruption caused the horses to rub one leg against the other, and in this way the character of the eruption was interfered with. But circular sores could be made out about the size of a pea.

Whether the boy inoculated himself by rubbing his eye when he had the virus of cow-pox or of horse-pox on his hand can only be a matter for conjecture. It is worthy of note that one of the assistant carters who helped the boy in grooming the pony likewise assisted in milking the cows, and had sores on his hands, and that the cow-pox in the cows and cow-men was antecedent to the farmer, boy, pony and horses developing the malady.

From material collected by me on June 16, from the contents of two primary vesicles on a teat of a cow (Fig. 4) just attacked at this farm, Dr. Blaxall produced an eruptive disease on a calf and rabbits which he regarded as undoubtedly cow-pox or vaccinia. Subsequent vaccination of the calf in the usual way with current lymph of known activity completely failed to take, and the vaccinous material collected from the rabbits when used for the vaccination of another calf and other rabbits produced results coinciding with those induced by current lymph. Later observations showed that rabbits vaccinated with the material obtained from the cow at this farm or with its removes were immunised to subsequent inoculation with the material (or its removes) obtained from the horses, and *vice versa* ; and hence it appears that each material produced the same disease, but in different animals ; that is, that the cow-pox and horse-pox were one and the same thing.

From the first cart-horse affected I succeeded in removing a vesicle from the leg just above the fetlock, and with this, rubbed up in sterile glycerine and water in the usual way, Dr. Blaxall inoculated a bull calf and three rabbits. As a result, only slight crusts formed on the rabbits, and this, treated in the usual fashion, produced no effect on other rabbits. On the calf the lines of incision showed only slightly raised crusts, except on the scrotum, where several small vesicles resulted. The contents of these vesicles were collected, and a second calf inoculated ; small vesicles appeared on the lines of incision, and from their contents a third calf was inoculated. The vaccinia produced in this third calf was in character more typical of that which follows inoculation of the calf with the current lymph of the station, and the lymph collected from this calf produced characteristic vesicles on other calves, and ten months afterwards, having been kept in cold store during the interval, produced characteristic vesicles on rabbits. Subsequent revaccination of the first and third calf failed to produce vaccinia. Dr. Blaxall points out that the passage through the calf of the material obtained from the horse increased its virulence,* for whereas the original material failed on rabbits, that which had been passed through the calf took well ; and that calves being more susceptible to vaccinia than rabbits, the fact that this horse material should take in the first instance but slightly on calves and fail on rabbits is only what might be expected.

At one farm visited, where the cows and milkers were affected, a lad aged 18, a milker, had first noticed a sore place over the first

* A similar manifestation is described by Dr. Blaxall. *See* "Report on Equine Variola," by Dr. Frank R. Blaxall, p. 568, Appendix C, Report of the Medical Officer of the Local Government Board, 1901-2.

phalangeal joint on the dorsal aspect of the ring finger of his left hand. This gradually developed until it assumed the appearance of a vaccination vesicle; the lymphatics of the arm became inflamed and the axillary glands enlarged and painful. About four days after the sore on his finger was first noticed, another vesicle began to form at the inner canthus of his right eye, and the glands at the angle of his jaw became enlarged. In addition, three vesicles appeared on the dorsum of his tongue; all these vesicles were regarded by his medical attendant as typical of vaccinia. Most probably this lad was first inoculated with cow-pox on his finger, and then transferred the infective material either from his affected hand or directly from an infected cow, to his eyelid. The inoculation of his tongue could be accounted for by his licking or sucking the sore on his finger. At the time this case was under review no material for experimental inoculation could be obtained from the milkers or from the cows.

During the inquiry illustration was afforded of the fact that in a district where cow-pox is known to exist eruptive affections of the hands of milkers merit careful inquiry before they can be accepted as resulting from inoculated cow-pox. I received a telegram from a medical practitioner stating that there was a well-matured case of cow-pox in a milker at a certain farm, and on visiting the farm I found a young married woman, aged 23, employed as a milker, who had a large vesicle on the wrist at the base of her left thumb, and a smaller, evidently secondary vesicle, on the inner side of the same thumb. Inflamed lymphatics stood out distinctly on the forearm and arm, the lymphatic gland at the elbow was enlarged and painful, and the glands in the axilla were affected. The appearance of the vesicle was so like that of the vesicle which follows inoculated cow-pox that at the time I considered that the woman had indeed been so inoculated. However, I failed to detect any eruption on the teats or udders of the sixty-four milch cows on this farm. I had opportunity of examining six of the seven milkers employed at this farm, and none of these had any affection of the hands. The woman had not been vaccinated since infancy, and no inmate of her home or at the farm had been recently vaccinated. Three weeks later the local public vaccinator at my request vaccinated this woman with the current calf lymph obtained from the Government Lymph Establishment, and eight days later four well-marked vesicles resulted. The case was kept under observation for some days, and the vesicles were seen to pass through the normal stages of a successful vaccination.

Material from the primary vesicle on the woman's wrist was submitted to Dr. Blaxall, and when inoculated by him on a calf, though setting up a certain amount of reaction, failed to produce anything

typical of vaccinia ; a sub-inoculation on another calf failed entirely. Attempts to vaccinate rabbits with the original material also failed.

Once cow-pox is introduced into a herd of milch cows, almost every animal in the herd becomes affected. That the progress of the disease may be stopped by taking suitable precautions is illustrated by the following case :—

On examination of the thirty milch cows at a particular farm, two, which had been but recently imported into the herd, were found to have eruptive disease of the teats and udders. The shed in which they stood contained thirteen cows, and two of these cows, other than the two manifestly affected, showed signs suspicious of like disease in an early stage. The suggestion was made to the farmer that the thirteen cows in this shed should be kept separate from the remainder of the herd, and that those affected should be milked after the others, that the milkers should wash their hands in a solution of permanganate of potash both before and after milking each cow and that the teats and udders of the cows should be dealt with in like manner. These preventive measures proved effective, for the farmer writing to me at a later date stated that the two cows first affected were practically well and that the only cow which had showed signs of eruption on the udder was one of the two cows regarded as possibly having the disease in an early stage on the day of my visit.

In the circumstances, the question of source or sources of the cow-pox was of primary and special interest.

Recent small-pox of the human subject as a source of infection of the infected herd could not be traced in any instance. Except in a single sanitary district of the wide rural areas in question, no small-pox had been notified during several years, while in the case of the particular district in which small-pox had been imported into a single family not long before cow-pox made its appearance on a neighbouring farm, no sort of relation could be traced between the small-pox and persons or cows on the farm in question. Nor was there evidence at all suggestive that cowmen suffering from local sores on their hands had in this way introduced infection into any herd ; cowmen without exception suffered, when they did suffer, in sequence to cows on which they attended. In a few instances, appearance of cow-pox in a herd was consistent with introduction of the disease through additions of some recently purchased cow or cows. But in the majority of instances the beginnings of the cow-pox could not be thus explained. If it were permissible to consider cow-food as a possible agent and distributor of cow-pox, the simultaneous invasion of many herds over a wide tract of country such as that here recorded, might perhaps lend itself to readier explanation.

Inquiry was made in this direction, and it was ascertained that oil cake in sacks had been received during the spring at several farms, and that this cake had come from Bristol.

This naturally directed attention to the outbreak of small-pox in Bristol and its neighbourhood, and for the following particulars I am indebted to Dr. Davies, Medical Officer of Health of that city.

In December, 1908, after the city had been free from small-pox for a year, a corn porter living at Bedminster was attacked by the disease. He was at work within the incubation period on a steamship that had come from Mariupol, Sea of Azov, and was discharging grain at Portishead. He developed a mild attack of small-pox on December 14, and was removed to hospital, whence he was discharged as cured on January 23. No other case of illness is known to have occurred on board the vessel. Before the first patient had left the hospital, a man living in another part of the city sickened on or about January 11. In this instance, although no direct communication could be traced, the lapse of a double incubation period (2 by 14 = 28 days) suggested causation through an intervening " missed " infection. This second patient travelled freely about the city before the nature of his illness was recognised. From this case two more in a common lodging house received infection. Other cases occurred in which the original source of infection could not be ascertained, and the infection was carried outside the city. The first case in Cossham was a man who worked at a mill where part of the consignment from the Bristol ship was delivered, so that his infection may have been derived from infected sacks rather than from secondary infection through a " missed " case. A family group of cases in Bedminster were relatives of the mill-owner.

The infection was of a virulent kind. Out of thirty-two city cases, six was hæmorrhagic at onset or later ; the infection was distributed and it is recognised that there must have been several " missed " cases. In all, some sixty cases were known to have occurred in the city and in the country round about.

A cattle drover who had been in contact on March 31 with one of the Bristol cases of small-pox left Bristol on April 10 with a flock of sheep, and travelling south apparently skirted Midsomer Norton and passed through Shepton Mallet to Speckington, Ilchester, returning to Bristol on April 19. His exact route could not be ascertained.

While I am of opinion that this outbreak of cow-pox was in some way connected with the recently antecedent small-pox in Bristol and its neighbourhood, I am fully aware that I failed to trace any direct connection. The exigencies of the public service necessitated my

being recalled for work of more urgent character, and the inquiry had to be abandoned.

In the years 1917 to 1920, inclusive, 588 cases* of small-pox are known to have occurred in England and Wales in 123 different sanitary districts. In no instance has there been any extensive spread of the infection except last year at Middleton, in Lancashire, where some eighty cases occurred in connection with cotton mills. The disease was extremely mild and no deaths occurred. The infection was probably conveyed by cotton imported from America. In these years there has been no spread of small-pox to rural districts nor to persons whose daily occupations would bring them into close contact with cattle.

The absence of knowledge of cow-pox in dairy farms in England at the present time is not, I imagine, due to the disease being unrecognised when it occurs, but to the fact that it is non-existent.

Original Articles.

A DESCRIPTION OF THE ABNORMAL REPRODUCTIVE SYSTEM OF A PIG.

By F. A. E. CREW and M. R. V. PANIKKAR
(*From the Animal Breeding Research Department, Edinburgh University.*)

THE abnormal genitalia of a ten-months old pig, together with certain notes made when the animal was killed, were sent by Mr. J. Jones, M.R.C.V.S., of the Veterinary Staff of the City of Edinburgh, to this Department, which is greatly indebted to him for much practical interest.

Somewhat similar cases have been described by Kingsbury, Hammond, Pick, Corner, Carth, Kopsch, and Szymonovicz, and Putz.

External characters.—Poorly-developed tusks were present in the lower jaw, and the bristles upon the back, while coarser than those of the typical female, were not so stout as those of the boar. The anus was normal in appearance and situation, and 4 cms. ventrally to it there was a tough conical structure, 5 cms. long, projecting backwards and upwards, while between the base of this and the anal orifice extended a prominent ridge of tissue (Fig. 1). These structures occupied the position of, and resembled an imperfect vulva and an abnormally large clitoris. But in addition, lying antero-ventrally to this conical structure, there was a scrotum within which the paired gonads could be palpated. The site of the prepuce was marked by an imperfect small conical elevation, and the mammary glands were but weakly developed.

* Excluding cases reported from Port Sanitary Districts.

Internal genitalia.—On dissection, the internal genitalia were found to consist of an intimate mixture of male and female structures (Figs. 2, 3, 4). The paired gonads had the appearance and dimensions of testes, abnormal in shape and colour, while of the accessory sexual apparatus the following structures could be identified: Paired epididymi, vasa deferentia, spermatic cords, seminal vesicles, bulbo-urethral glands, prostate, urethra, and abnormal penis—representing the male

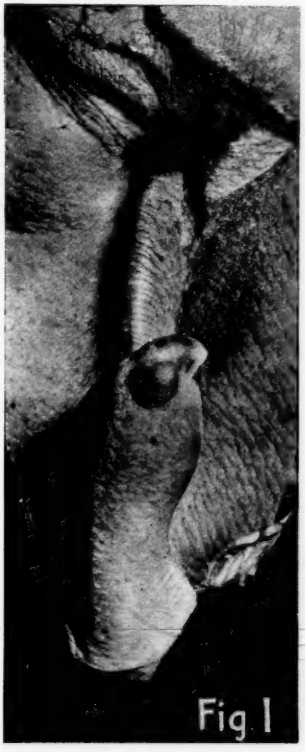

FIG. 1.—The external genitalia. Anus, erectile organ and prominent ridge between.

structures, and a uterus with well-developed horns and broad ligaments together with a vagina—those of the female apparatus.

The elliptical gonads measured 4.5 cms. in their longest diameter, and the deep purple colour of the tissue within could be seen through the pearly-white of the dense capsule. The contours of each gonad were regular, save in the region of the attachment of the tail of the

apparently normal epididymis, where two small rounded nodules—the largest in each case measuring 1×0·6 cms.—stood out from the general surface level. Fused with the epididymis on either side was the

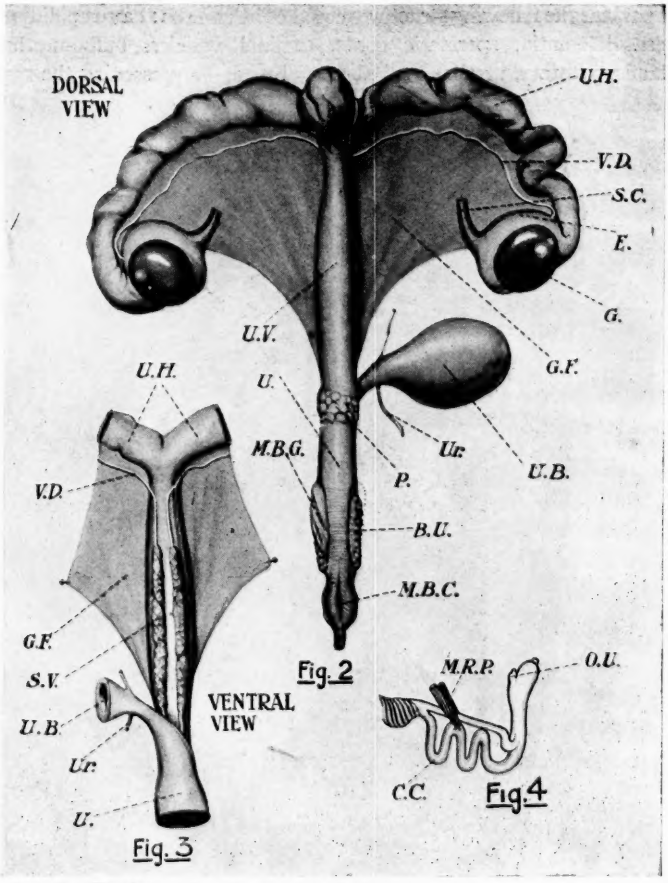

FIG. 2.—The internal genitalia : dorsal view.
FIG. 3.—The internal genitalia : ventral view.
FIG. 4.—The termination of the urethra and *corpus cavernosum penis.*

B.U. Bulbo-urethal gland.
C.C. *Corpus cavernosum penis.*
E. Epididymis.
G. Gonad.
G.F. Genital fold.
M.B.C. M. bulbo-cavernosus.
M.B.G. M. urethralis.
M.R.P. M. retractor penis.
O.U. Orifice of urethra.
P. Prostate.
S.C. Spermatic cord.
S.V. Seminal vesicle.
U. Urethra.
U.B. Urinary bladder.
U.H. Uterine horn.
UR. Ureter.
U.V. Utero-vagina.
V.D. Vas deferens.

wide termination of the uterine horn. The gonad, therefore, was suspended by the uterine horn with its normally disposed broad ligament.

Each uterine horn (50 × 2.5 cms.) was but slightly flexuous, and had thin and collapsed walls. Nearing its termination by fusion in the epididymis, each horn increased in calibre. There was no distinct differentiation between the body of the uterus, the cervix, and the vagina, although in the region of the neck the lumen became smaller

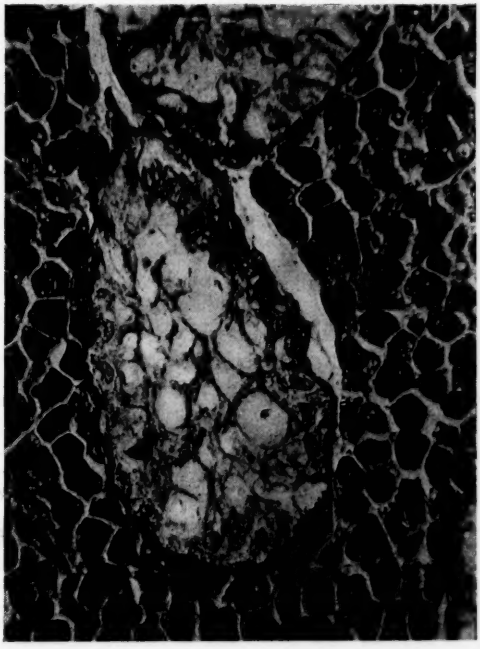

FIG. 5.—Micro-photograph of section of gonad, showing the degeneration within the seminiferous tubules and the hyplasia of the intertubular tissue. × 400.

and the internal surface was slightly marked with the characteristic prominences. The vagina in fusing with the urethra ended blindly beneath the prostate.

Each spermatic cord was normal in construction. The *vas deferens*, taking origin in the tail of the epididymis, passed within the layers of the broad ligament, running parallel with the dorsal border of the uterine horn to reach the body of the uterus, making its way through the substance of the seminal vesicle, and receiving tributary ducts

therefrom, to enter the urethra. Its calibre, as it passed through the seminal vesicle, gradually increased, and the thickness of its wall diminished.

Each seminal vesicle (Fig. 3) was firmly attached dorsally to the utero-vagina, had a dense fibrous capsule, and a glandular structure, from which a pale turbid fluid could be expressed. Somewhat compressed dorso-ventrally the lobulated mass had a length of 12 cms., was 2 cms. wide, and extended more than half the whole length of the utero-vaginal body. Ventrally the seminal vesicles were in contact with the bladder and the ureters, but had no relation with the prostate and bulbo-urethral glands.

From the neck of the bladder of normal appearance passed the urethra with a diameter of 1.25 cms. to meet the vaginal part of the utero-vaginal body, and at the place of their fusion the body of the prostate lay dorsally. It was elliptical in shape, had the typical lobulated structure, and lay somewhat obliquely across the long axis of utero-vaginal mass. The longest diameter of the gland measured 3 cms., and the tissue was of a pale yellow colour, denser and more compact than that of the seminal vesicles. In consequence of the presence of the uterus, the prostate had no relation with the seminal vesicles, or with the neck of the bladder.

Later, when the wall of the broader part of the urethra was laid open, the *pars disseminata* of the prostate (though not well developed), the *colliculus seminalis*, the openings of the *ductus deferens* on either side of it, the smaller openings of the prostatic ducts, and the two larger openings of the bulbo-urethral glands could be identified.

The bulbo-urethral glands, 4.25 cms. × 1.5 cms. in size, and normal in appearance, were very much smaller than those of a typical boar. From near the posterior part of each gland a large duct passed into the urethra.

The urethra emerged alone from beneath the prostate (the vagina having ended blindly), but its calibre was much increased, being now 3 cms., its walls were much thicker, and at a point 11 cms. beyond the prostate it showed a distinct constriction, immediately beyond which indications of a bulb could be distinguished. In contact with the bulb and extending forward were the bulbo-urethral glands placed latero-dorsally. Distal to the bulb, the diameter of the urethra gradually diminished, and its walls became more fibrous. But instead of following the flexuous course of the *corpus cavernosum penis*, it took a direct route along the dorsal aspect of the penis to the base of the structure, which was likened to an abnormal *clitoris*.

The *corpus cavernosum penis*.—The body of the penis had its origin near the urethral bulb, and was dense and laterally compressed.

After a short straight course, it continued backwards in a series of curves till it reached the perineal region, where it was joined by the terminal portion of the urethra. The adjoining curves were held together by connective tissue. The two structures subsequent to their incorporation proceeded together, enclosed in a covering of skin, forming the conical structure which projected backwards and upwards. The urethral part did not extend as far as the tip of the structure, however, but terminated at a point 1.5 cm. therefrom. Between these two points there was a narrow slit-like opening, the external urethral orifice. The body of the penis, from root to the tip, when extended, measured about 17 cms. The short bulbo-cavernous muscle was identified, but no suspensory ligament was found. The two parts of the M. retractor penis appeared to be quite independent. Each passed backwards and downwards on the corresponding side of the rectum to end on the lateral side of the second curve in a very feeble fibrous attachment. On examination, the muscle was found to be composed mainly of non-striated fibres. The ridge of tissue which extended between the anus and the base of the penis consisted entirely of a mass of striped muscle fibres covered externally with skin.

MICROSCOPICAL EXAMINATION.

The gonads (Fig. 5).—The usual peritoneum and the *tunica albuginea* were observed. In addition, at the region of the nodules, there was another distinct layer of *albuginea* separating the substance of the nodule from that of the main part. In certain other peripheral situations also similar masses of cells were separated from the main bulk of the gonad by *tunica albuginea*.

The substance of both parts consisted of scattered structures resembling seminiferous tubules, separated by great masses of intertubular material. The tubules were of varying size and shape. Nearer to the region of the rete, the cross-sections of the tubules were smaller and more regular. In most of them a distinct *membrana propria* could be identified, and some of the tubules contained few, others more numerous germinative cells. No layer arrangement, or any signs of active spermatogenesis could be found in any tubules, which in most cases did not possess any distinct lumen; many consisted almost entirely of disintegrated cell material and vacuoles. No germ cells in their later stages of development (spermatocytes and spermatids) were identified, even in those that contained the largest number of germinative cells, but cells of *Sertoli* could be recognised. In the nodules these structures were less numerous, and showed greater degeneration.

The intertubular material formed the predominating feature of the microscopical field, and consisted mostly of masses of polyhedral

cells, at certain places continuous, and at others separated by fine strands of connective tissue. These cells had large spheroidal eccentric nuclei, granular cytoplasm, and vacuoles near the periphery. Just under the *tunica albuginea* and in regions surrounding certain of the more developed seminiferous tubules and around the blood vessels, there were to be seen cells which were more or less spindle-shaped, and had deeply staining elongated nuclei. Throughout the intertubular material typical connective tissue was relatively small in amount, but the blood supply appeared to be relatively increased. The majority of the cells of the intertubular material had retained their primitive shape, the result, possibly, of the absence of that mechanical pressure which must be present in a normally developing gonad during the active growth of the sex-cords.

The seminal vesicles, vas, prostate, bulbo-urethral glands, and uterus presented a normal histological structure, but the last was undergoing fibrous degeneration.

The points of interest in this case are as follows. The abnormality consisted in the intersexual condition of the reproductive system. The testes, though situated within a scrotum, were abnormal in histological structure, in many ways resembling that characteristic of a cryptorchid. No definite ovarian tissue was present, yet certain of the organs of the female accessory sexual apparatus were well developed. The interstitial material was relatively greatly increased in amount, yet the sex characters were not so well developed as those of a normal individual.

No history of faulty feeding was available, and, in any case, the condition found in this pig cannot be explained in terms of a diet deficient in the water-soluble vitamine. If the abnormality is regarded simply as a result of an imperfect development of the testes of a male, the question of the cause of such an inherent imperfection remains unanswered. It is possible that this case is equivalent to the free-martin of cattle, a female partially transformed into a somatic male by the action of the sex-hormone of a male in utero.

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Clinical.

FIBRO-LIPOMA OF THE EYE.

By WALTER GARDNER, M.R.C.V.S.,
Maybole, N.B.

THE subject was a valuable two-year old pedigree Clydesdale filly which had been grazed in a home paddock with another filly since being weaned, and was never known to have met with any accident to the eye. I learned from the owner that when he first observed that anything was amiss with her the conjunctiva of the lower eyelid seemed red, swollen, and somewhat everted. He took no serious

FIG. 1.—Fibro-Lipoma of the Eye.

view of the condition, as it apparently "came and went," and the filly was turned away to grass for summer.

When seen again it was evident to the owner that the eye had rapidly become worse. The filly showed evidence of pain, there was excessive lachrymation, mixed with pus, and she had lost condition.

On July 6, in consultation with my esteemed neighbour, Mr. H. Gillmor, M.R.C.V.S., Ayr, a careful examination was made. It was decided to operate three days later, as she was unmarketable in present condition. Our diagnosis was that it was either a cyst or a fatty tumour.

The subject was prepared, cast and put under chloroform. The seat of operation received repeated applications of 5 per cent. solution of cocaine and adrenalin, and the growth was carefully dissected out. It was elliptical in shape, possessed a glistening capsule, and was of a soft, flabby nature ; about the size of a hen egg, and occupying the full extent of the fossa of the lower eyelid and half the orbit. It was deeply inserted and firmly adherent to the periosteum at either canthus. At the inner it was posterior to, and partly involving, the membrana nictitans. Its external surface ran parallel to the margin

FIG. 2.—Two months after operation.

of the lower eyelid, whilst its inner surface was growing to the eyeball at the junction of the cornea and the sclerotic.

The operation wound was stitched, and the eyelid brought into as near the normal conformation as possible with fine silk sutures.

The after treatment consisted of a mild collyrium applied once daily after fomentation. The stitches were removed ten days after operation, and the filly made an uneventful recovery.

When seen two months afterwards there was no trace of disfigurement of eye. The filly has grown and put on condition.

I forwarded the specimen to Dr. O. Charnock Bradley, Principal of the Royal (Dick) Veterinary College, Edinburgh, for his examination and opinion, and I received a report from Professor Mathieson that the microscopical examination proved it to be a fibro-lipoma.

THE TREATMENT OF SCLEROSTOMA WITH ATOXYL.

By Vety. Capt. REES-MOGG, O.B.E., F.R.C.V.S.,
1st Life Guards, Regent's Park Barracks, N.W.

In a number of the Veterinary Journal about eight years ago there was a very interesting article translated from some foreign veterinary journal concerning the use of Atoxyl in the treatment of young horses suffering from *Sclerostoma Armata* and *Sclerostoma Tetracantha*.

In 1914 I owned a three-year old colt which I had bred, which nearly died of this disease, and I sent a report of this case in 1915 to the *Veterinary Record*. As it may interest some of your readers, I am now sending you a report of a similar case.

Last August I bought at Tattersall's a thoroughbred three-year old pony mare. She was in poor condition. I sent the young pony with three old ponies to a field I have in the country, and, with one exception about a fortnight later, I did not see the ponies again for two months. I used to get letters periodically to say that owing to the drought, "keep" was getting very scarce, and in consequence, the ponies were not doing well. On arriving home in October, I was horrified to find how very thin the three-year-old mare had become, also extremely weak and dreadfully depressed—in fact, she looked as if she were going to die. I at once suspected that the little red worms were the cause, and put the filly into a stable, and examined several of her droppings, but could not find any worms. I gave her two draughts, one in the morning and one at night, each consisting of two ounces ot turpentine and half pint of linseed oil in a pint of milk. I then found some *Sclerostoma Tetracantha* in her excreta.

I commenced by giving her daily for three days the following drench: Thymol, 1 oz.; Oil of chenopodium, 1 oz., Liquid paraffin, 4 ozs., Milk and water, 3 pints. (Thymol blisters the mouth and lips if not well diluted).

I also gave her a daily injection of ten grains of atoxyl subcutaneously, using a different place every time, and in addition, gave her, in powders, 30 grains of arsenic daily.

Worms were evacuated in large numbers in every dropping, as many as ten *Sclerostoma Tetracantha* being found in one dropping, and occasionally a few *Sclerostoma Armata*.

As the draughts used to put the filly off her appetite, I now gave them only twice a week, giving only half an ounce of thymol. Every fourth day I slightly increased the dose ot atoxyl until 60 grains were reached, but as this caused purgation, I gave only 30 grains usually, but increased the dose of arsenic to 60 grains a day. I knew from

Major Holmes' Treatment of Surra in India that by gradually increasing the doses of atoxyl and arsenic, enormous doses could be given, and the only ill effect that my filly seemed to suffer from was that twice she had slight colicky pains for a short time.

After three weeks I discontinued giving the draughts, but continued for another month with the atoxyl and arsenic, as many worms were still being passed, though the filly had improved greatly in condition, and was much brighter in every way, and I commenced to break her in on long reigns, etc. The filly is now quite cured, but has lately developed when ridden a very bad temper. I would like to enquire of your readers if this might possibly be caused by her digestion being upset through the trouble caused by the worms.

Owing to atoxyl, oil of chenopodium, and thymol being all very expensive, the treatment was extremely costly.

I am indebted to Mr. John Brown, of Invergordon, for recommending me to use atoxyl, and to the late Mr. Wallis Hoare for recommending me to use thymol in enormous doses, and oil of chenopodium.

AN EARLY CYSTIC CALCULUS. THE LEGAL ASPECT.

By G. H. STENT, M.R.C.V.S.,
Manchester.

CALCULI of the urinary passages are not at all uncommon in the dog and bitch, but it is not usual to get one of the size and weight here recorded.

The patient, a pedigree wire fox-terrier puppy, one of a litter of five, aged only five months, was brought to me by the owner on account of a difficulty in micturition. On examining it per rectum, I found a calculus present in the bladder, and advised an operation. I operated in the prepupic situation and removed a calculus, almost round in shape, three inches in circumference, and weighing five drachms. The patient has made an excellent and uninterrupted recovery.

I record this case as some guide to the period a calculus of this size may take in formation, as it is evident from this case they may form much more rapidly than generally supposed.

There is the legal aspect to be considered where valuable dogs are sold on a guarantee of soundness, or examined by a veterinary surgeon before purchase, for where no clinical symptoms are observed, as in the earlier stages of this case, the presence of a calculus may readily be overlooked. This aspect comes home particularly to myself, as I had selected and examined two others of this same litter a month previously for clients. By good luck I had missed the affected one, the others being found to be free on a special examination which I made later.

"PUT AND TAKE"—A CANINE PASSAGE.

By G. MAYALL, M.R.C.V.S.,
Bolton.

On Sunday, January 15, a rough-haired fox-terrier dog, "Jazz," thirteen months old, was brought to me with the history that a brass "Put and Take" top, "put" on the hearthrug, had been "taken" up and swallowed by him. The dog was making a noise in his throat, and on passing the probang and giving a good tablespoonful of medicinal paraffin he seemed greatly relieved. I told the owner to give the subject some suet pudding and keep him under observation, so that his stools might be watched, and if any bad symptoms developed to let me know. On calling to see the dog a few days later, I found that he had passed the "top" on Tuesday afternoon, January 17. The owner had no suet pudding handy, but had given him a good feed of the under-side of the suet crust of a potato pie. The dog was evidently one of those conscientious animals who protested in the best way he knew against the gambling instincts of humanity. The "top" was a solid brass one, weighing seven-eighths of an ounce, one and one-eighth inches long, and five-eighths of an inch wide in the body. It was discoloured and almost black when passed by the dog in the back yard of a house in Sylvester Street, Bolton.

DIPHTHERIA: A CONSIDERATION OF THE METHODS OF SPREAD AND OF PREVENTION: CARRIERS AND THEIR TREATMENT.*

By F. C. LINTON, M.A., M.B., D.P.H.,
Medical Officer of Health, Tunbridge Wells. (*Member.*)

Speaking of animal carriers, Dr. Linton said: "Of these I must confess I have little to say: the cat has long been reputed to be a possible diphtheria carrier. Savage has performed experiments which go to prove that kittens cannot carry the K.L. Bacillus. Simmons, however, records (*Medical Science*, April 1921), a definite instance of an elderly lady who developed a fatal attack of faucial diphtheria after fondling a cat which had been ill for one week before her illness began. Throat cultures from the cat and the patient showed morphologically similar organisms resembling diphtheria bacilli, and their virulence for guinea pigs was the same. The cat was killed, and, on post mortem, a small ulcer was found covered with a yellowish membrane on the upper surface of the left nasal fossa, yielding diphtheria bacilli on culture. A second cat which had played with the first yielded a throat culture showing morphologically typical diphtheria

*Abstract from a Paper read before the Sanitary Congress, Folkestone, June, 1921, and published in full in the *Journal* of the Royal Sanitary Institute.

bacilli ; this cat died after eight days' confinement in a cage, and post mortem showed small membranous particles on the vocal cords from which virulent diphtheria bacilli were grown.

Savage's experiments in infecting mucous surfaces were performed, if I read the description correctly, upon kittens. Might not a possible explanation be that the kitten is immune where the cat is not ? An analogy could be found in the immunity from Scarlet Fever of infants under one year, changing to susceptibility soon after.

CASE OF TUBERCULOSIS OF THE SKIN FOLLOWING A CAT BITE.*

By HALDIN DAVIS, M.B.

PATIENT, a male, who was bitten on the back of the hand by a cat nine or ten months ago. The wound never healed properly, and in the scar there gradually developed the present lesion, which is red and exhibits a few points ot suppuration. On the palmar aspect of the the scar eminence are four little apple-jelly nodules marking the imprint of the animal's teeth. The clinical diagnosis has been confirmed by a microscopical examination of a piece of the lesion. Tuberculosis in cats is somewhat rare, but Petit has found in doing a number of autopsies of stray cats that about 2 per cent. ot them were tuberculous. The disease in these animals affects the intestinal tract far more often than the lungs, hence the danger of infection from a bite. Another point which adds to the danger of infection is that tuberculous lesions in cats are usually much richer in tubercle bacilli than the corresponding lesion in human subjects. A few years ago Sir Arnold Lawson published three cases in which children had contracted fur infections from cats, one of which was tuberculous.

Abstracts.

INTOXICATION BY MOULDY BREAD.

By MESSIEURS BROCQEROUSSEU,
Forgeot and Urbain.

A RATHER large number of cases of intoxication, attributed to the ingestion of mouldy bread, have been observed in man and animals. Authors have given very varied clinical descriptions and if in a certain number of cases, it seems that mouldy bread may be incriminated, in others on the contrary there has certainly been a coincidence between ingestion of mouldy bread and troubles due to another cause.

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*Proceedings of the Royal Society of Medicine, Section of Dermatology, January, 1922.)

In 1854 Gaverian mentions 40 horses being ill after 5 to 6 weeks' feeding with part mouldy bread. The symptoms were those of acute gastro-intestinal inflammation and three horses died.

In 1863 Fischer related where two horses ate about 2 lbs. of mouldy bread and were depressed and in an almost comatose state, had palpitation of the heart, small and soft pulse, and pale mucosæ.

In 1872 Cornevin reported the poisoning of two pigs and a horse from eating mouldy bread. The horse and one pig died. There was a red mould on the bread in these cases.

In 1873 Cagny announced the poisoning of some cows with mouldy bread, and in 1881 he mentions the case of six horses being poisoned similarly. Here also there was a red mould on the bread.

In 1881 Méguin mentions two cases in the horse. In 1882 Abadie, Menier and Lecormié record 12 cases in the horse. Many other authors give accounts of mouldy bread poisoning.

In 1919 W. Herter and A. Fornet made a close study of mouldy bread. The moulds found in the order of frequency were :—

1.—*Aspergillus glaucus.*
2.—*Rhizopus nigricans.*
3.—*Penicillium crustaceum.*
4.—*Oospora variabilis.*
5.—*Penicillium olivaceum.*
6.—*Aspergillus fumigatus.*
7.———————— *niger.*
8.———————— *flavus.*
9.———————— *nidulans.*
10.———————— *candidus.*
11.—*Mucor pusillus.*
12.—*Oospora lactis.*
13.—*Mycoderma cerevisiæ.*

H. & F. conclude :—

(*a*) Bread kept in the open air shows all traces of mouldiness.
(*b*) Bread wrapped in paper not gummed on removal from the oven moulds slowly.
(*c*) Bread wrapped in paper and put back into the oven only goes very slightly mouldy.
(*d*) Moulds pass across ungummed paper when it is damp.
(*e*) The quality of the wrapping paper has an influence on the keeping of the bread.

The results of experience show that the attack on bread is an external one and that germs in suspension in the air play the chief rôle in bread going mouldy.

SYMPTOMS OF THE INTOXICATION.

In all the animals (horse, cow, pig), common victims of intoxication from ingestion of mouldy bread, the symptoms observed may be divided into two types :—

A gastro-intestinal form.

A meningeal form.

Gastro-intestinal form.—This is not the form most generally observed. One notices dull colic, diarrhœa, relaxation of the sphincters, a saburral state of the mucosa of the first portion of the digestive tract ; then signs of vertigo appear which alternate with periods of coma.

Meningeal form.—This is the more common form one observes. Maybe dullness and depression, continual stupor, with weak muscular ability, so that the animals cannot hold themselves up ; maybe on the contrary a true acute meningo-encephalitis with mazy bouts, contraction of the jaws, disorded gait, etc., etc. Often enough one notices persistent paraplegia as a complication. In both forms one often notices disturbance of vision.

Here is a picture of the symptoms presented by some regimental horses that ate mouldy bread in October, 1919. Staggering gait, contraction of the jaws, dryness of the buccal mucosa, almost complete blindness, spasmodic emissions of urine ; then followed a period of excitement ; the patient bored at the wall, fell on the ground, got up and bounded forward ; this phase lasted some hours. A period of prostration then followed during which the animal remained stupid, with its head in the manger or on the ground. If the horse did not die it returned quickly to its normal state. This, as one may see, is clearly the meningeal form heretofore described. Fourteen horses were ill and four of them died.

Lesions.—The lesions varied according to the cases ; there was nothing specific. If the gastro-intestinal form predominates one finds lesions of the digestive apparatus ; if the meningeal form is exhibited one then finds lesions of the nervous system.

Experimental Study.—Experimentally it has not been possible to produce symptoms of intoxication in animals by feeding mouldy bread. Welte, Herter, and Fornet made extensive experiments in this connection, but dogs alone were temporarily ill, showing nausea and vomiting.

The conclusions Messieurs B., F. and V. arrive at are :—

1.—It is not possible to admit, in the actual state of our knowledge, that the fungi found on mouldy bread may be the cause of the accidents observed nor that the products of secretion can be incriminated as being the agents of these intoxications.

2.—It is very probable that intoxications following the ingestion of mouldy bread must be ascribed to bacteria contained in these breads. The study of organic liquids and of the organs taken from dead animals will enable us without doubt to determine in each case the microbian species causing the phenomena observed.

3.—In one of the breads that we have studied the presence of a bacillus of the anthracoid group explained the death of the animals that consumed this bread. But the presence of pathogenic bacteria can have no connection with the mouldy bread ; this bacterium might just as well have been found in perfectly kept bread.

4.—With the uncertainty still existing in this matter we should remember that the consumption of mouldy bread is probably not without danger, and that altered or mouldy bread ought not to enter into the ration of animals.—*Recueil de Médecine Vétérinaire.* G. M.

TREATMENT OF EPIZOOTIC DIARRHŒA OF FOWLS.

By Dr. BRU.

By this clinical name we include epizootic diarrhœas in fowls and certain rapid forms in which the symptom of diarrhœa is wanting, such as *fowl cholera*, a septicæmic affection due to the *ovoid bacterium*, *white diarrhœa of chicks*, due to the *bacillus pullorum*, and which often coexists with the cholera of adults, *ovian typhus* (fowl typhoid of the United States), colibacillary infection, often with a terrible evolution, whose causal agent, similar to that of typhoid fever, has been called by Moore *bacterium sanguinarum*. Notably during the year 1919 these different maladies, and above all fowl cholera, have prevailed in several localities in France and have shown a marked epidemic character. In certain Southern departments they have affected more than half of the poultry yards and comprised in some weeks in several of them two-thirds and sometimes three-fourths of the flock. Pullets were more often attacked than old birds, whilst chickens were mostly exempt. It is every year in the month of June that these maladies take on an epidemic character, and throughout the summer months they occasion serious losses.

We therefore deem it an opportune time to make known tried methods of treatment which have enabled our *confrères* to arrest the ravages of contagion in two or three days and sometimes in 24 hours.

Preventive Treatment.—Immunisation by injections of anticholeric serum has not entered into the current practice, and different other medications proposed have generally been insufficient. The gravity

of the 1919 epidemic (chiefly cholera of fowls) induced my father, M. A. Bru, veterinary surgeon at Candecoste (Lot-et-Garvonne), to try the preventive treatment advised by Nocard, consisting of intramuscular injections of carbolised water.

The first trial was carried out on a lot of eight strong hens of the Black Orpington breed, the only survivors out of a flock of 30. Five cc. of a solution of 5 per cent. crystallised carbolic acid was injected into the thickness of the pectoral muscles on one side of the breastbone. Almost immediately after injection three of these birds subsided and were dead in less than 5 minutes. The five others were hard put to it; although remaining on their legs, they were panting, the mouth open as in the full heat of summer; half an hour afterwards they had almost recovered their normal state and none of them died as a result. In a second lot of 10 head, representing, as before, about a quarter of the flock surviving, the quantity of injection was reduced to 4 cc. of a similar solution.

One fowl only, the smallest, already ill, collapsed; cold douches revived it, but it remained for several hours in a comatose state. On the morrow it had recovered, and like the nine others remained immune from the malady during the months that followed.

The solution was then reduced to 3 per cent.:—

Crystallised carbolic acid	3 gr.
Distilled water	100 ,,

the dose injected from 3 to 4 cc. according to size.

Several hundreds of the birds have been thus inoculated; in all the poultry yards the progress of the malady has been arrested. There have only been losses amongst the birds already gravely affected at the moment of injection and which have died the same day. The great part of the sick ones have been cured; the carbolised injections have therefore an effect at once preventive and curative.

In 1920 this procedure applied at the commencement of the summer, checked the birth of the epidemic and avoided important losses; the figure of its efficacy is at least 95 per cent. . Subjects treated remained free during the months which followed up to the commencement of winter, a period over which the contagion extends. Diarrhœa has not been severe on fowls, but turkeys have paid heavy toll to it. M. A. Bru inoculated 100 of them with 4 or 5 cc. of a 3 per cent. solution, but success has not been the same as with fowls. The injection has not appeared to sensibly decrease the progress of contagion. Was this disease of turkeys due to a different microbran agent or was the dose injected too weak, having regard to the relative weight of these animals? The turkeys, too, seemed more sensible than the fowls to intoxication by carbolic acid, and we found them badly tolerant

of a dose of 10 cc. of a 3 per cent. solution preventive. Shortly, this method of treatment has the following advantages :—It is effective, economic, simple, and rapid of execution. A 20 cc. syringe once filled will serve to inoculate successively six birds, which as they are done are at once set at liberty. The veterinary surgeon has an interest in not passing on the exact composition of the " vaccine " used to his clients, who would be inclined to inject the carbolic solution themselves. How many breeders educated by veterinary surgeons themselves give their services for vaccinations, and even inoculations of tuberculin !

Curative Treatment.—We do not insist on the measures usually prescribed : isolation of the sick birds and disinfection of the locale. The following formula has given us excellent results, above all in cases of white diarrhœa of fowls and ducklings, frequent in the Toulouse region:—

Salol	4 gr.
Benzonaphthol	2 ,,
Powdered grey quinine	125 ,,
,, green bone	125 ,,

A good spoonful (about 10 grammes) for 10 fowls, a teaspoonful for 10 chickens or ducklings, in the morning ration (paste of bran base, soup, potatoes and cooked grain).

This mixture comprises :–

1. Intestinal *antiseptics*, insoluble, but split up in the intestine, the salol into salicylic acid and phenol, the benzonaphthol into benzoic acid and naphthol, all very active substances in the treatment of infectious diarrhœa.

2. *Astringents.*—Grey quinine is of all quinines the least rich in alkaloids, but on the other hand the most astringent, thanks to its large proportion of quinotannic acid, which is the tannin from quinine bark.

3. *Tonics.*—Quinine has a stimulant action derived from its febrifuge alkaloids (quinine, cinchonine, etc.) and quinotannic acid ; the green bone powder is rich in assimilable phosphates. Phosphates, besides, have an antidiarrhœic action which has long been recognised.

Any other astringents, such as extract of dry cachou or tonic or antiseptic can be added to the above formula. Five to 10 grammes of extract of dry cachou can be added to our formula.

To each litre ($1\frac{3}{4}$ pints) of drinking water, which should be frequently renewed, we advise the addition of three drops of a phenol product such as liquid carbolic, lysol, phenosalyl. We would add that disinfection ought not to be limited to the locales. The birds themselves, in the hen house, for example, ought to be sprinkled with a carbolised solution 50 per 1,000 once a day if possible.—*Revue Veterinaire.* G. M.

LOSSES FROM FOOT-AND-MOUTH DISEASE.

THE Ministry's present policy in dealing with Foot and Mouth Disease is that of slaughter of all affected and contact animals. The justification for this is the experience which this country has gained in the past, and other countries more recently, that the only sure weapon against the disease is immediate eradication by drastic means. The virus can be carried long distances on the feet of animals, or on the boots and clothes of persons, and even by rats, rabbits, birds, or by the wind. There is always the danger of spread, therefore, whilst any living virus remains, and to allow affected cattle to remain alive simply means that living factories turning out disease are permitted to be established in the country.

If slaughter is not resorted to as a general policy, it may be taken as a foregone conclusion, so virulent is the disease, that, no matter what steps as to isolation and disinfection are taken, the disease will run through the land. Just before the last great outbreak of the 80's, the Chief Constable of Cumberland, who was connected with some very successful pioneer work undertaken in Cumberland and Westmorland against the disease, reported that the losses caused by Foot and Mouth Disease, at a most careful estimate, which the authorities admitted to be rather under than over the mark, were no less than £43,000 per annum for the two counties. This figure covered deaths, depreciation in affected animals, loss in young stock, loss in milk and butter, and the necessary veterinary and other expenses. Applying this figure to the whole of Great Britain (35,000,000 cattle) on the basis of the proportion of cattle in Cumberland and Westmorland (1,000,000), it appears that from 1870-76 the approximate annual loss through Foot and Mouth Disease was not less than £1,500,000.

Turning to foreign countries, it is estimated that in France, in 1919-20, with some 855,000 cattle affected, the loss from mortality, flesh, milk, butter, etc., was not less than £5,000,000. In Holland the annual loss to farmers is reported to be in the neighbourhood of £2,500,000. In the United States a sudden outbreak of disease in 1914, which infected the Chicago stockyards, cost the Government £1,500,000 to eradicate in the country.

Having in view the island position of our country, and the comparatively small risk there is of frequent re-infection, it will be seen that a policy of ruthless slaughter at the earliest known moment of infection is the only possible measure. The one conceivable alternative, *i.e.*, isolation and treatment, besides subjecting farmers to a possibly very heavy loss, and certainly much annoyance through restriction of movement, would have the effect of keeping foreign ports closed to our pedigree cattle for many months longer than would otherwise be the case. It would, in addition, be a specially serious menace to our large flocks of sheep, many of which cannot be successfully isolated, as in many districts they run in thousands on open or common pasture-ground.—(*Ministry of Agriculture and Fisheries, February* 3, 1922.)

Reviews.

REPORT ON THE LIVE STOCK INDUSTRIES OF THE NORTHERN TERRITORIES OF THE GOLD COAST COLONY. By CAPTAIN W. P. B. BEAL, Veterinary Officer, Gold Coast. Government Press, Accra, 1920.

THE veterinary officer of this Colony is doing giant's work in trying to point out the true way in which the live stock industry of the country can be improved and the stock itself greatly increased. In the Governor of the Colony and Commander-in-Chief (Brigadier-General F. G. Guggisberg) he has an appreciative and enthusiastic helpmate. The Chief backs up Captain Beal's request for a substantial increase in the veterinary staff, and also asks for sanction to be given for a sufficient expenditure of money for the purchase of animals to replenish and improve breeding stock. The Governor, in a letter to Lord Milner, enclosing Captain Beal's report, makes the following wise remark :—" I desire to point out that the proposed expenditure of approximately £15,500 on the Veterinary Department for the period of one year is incurred in the interest of an industry placed at a valuation of £646,985 for the Northern Territories alone." Lord Milner, in his reply, approves of the expenditure proposed, but writes :—" I anticipate, however, that there will be some difficulty in obtaining the additional veterinary officers." The Veterinary Officer's Report is a well-thought-out and well-reasoned survey of the whole position of the live stock industry of the Colony, and a clear statement is given as to how the shortage and failure of meat supply in the Colony can be improved and remedied. Breeding at present is a haphazard venture, the care and management of stock is quite primitive, and little attempt made to check the origin or spread of epizootic diseases.

A strong and reasoned case is made out for the reorganisation of the Veterinary Department (its separation from the control of the principal medical officer), and its division into a veterinary section and a live stock section. At the end of his recommendations Captain Beal expresses a hope (which we in this country may remember in making requests to municipal and government departments in the future) that " the Government will base the veterinary estimates on a percentage in the pound of the valuation of the live-stock in the country. I do not think a shilling in the pound is too much."

Let us hope the grand work Captain Beal is doing in a broad-minded, discerning way will be appreciated and remembered not only by those in the country where he resides, but also by his professional brethren over here. G. M.

ANNUAL REPORT OF THE BENGAL VETERINARY COLLEGE AND OF THE CIVIL VETERINARY DEPARTMENT, BENGAL, FOR THE YEAR 1920-1921. Calcutta: Bengal Secretariat Book Depot, 1921.

Two favourable and important facts emerge at once from the pages of this report. One, Colonel A. Smith, F.R.C.V.S., has been declared " Head of the Civil Veterinary Department, Bengal," with the title of " Veterinary Adviser to the Government of Bengal." Thus the Civil Veterinary Department becomes self-controlled instead of being

under the Director of Agriculture. Another, the grading and rates of pay of the Provincial Veterinary Services stands to be improved.

The results of the teaching at the College, as furnished by examination results, have not been as favourable as in the past, and the Board of Examiners recommend the prompt appointment of two more Imperial officers as teachers. The Principal of the College agrees with the recommendation of the Examining Board. There were 127 students at the College, 2,097 patients were treated, and 460 operations performed. The Raymond Research Laboratory did good work in the examination of material from rabid and suspected rabid animals and the manufacture of large amounts of sera against rinderpest and hæmorrhagic septicæmia.

The Civil Veterinary Department was under the control of Mr. P. J. Kerr, M.R.C.V.S., with Mr. A. D. MacGregor, M.R.C.V.S., acting as *locum* during his absence on leave. Rinderpest as usual has been the most serious prevalent disease, and hæmorrhagic septicæmia comes next. Results of treatment with sera have been very satisfactory. There has been an increase of two in the veterinary dispensaries of the country. These dispensaries do good work, and in many cases are well supported. Sir Daniel Hamilton sent six Ayrshire cows and one bull as a present to one of the breeding farms. G. M.

Personal.

MAJOR-GENERAL THE RT. HON. J. E. B. SEELY, C.B., C.M.G., P.C., D.S.O., M.P., has consented to accept the Office of President of the Thirty-third Congress of The Royal Sanitary Institute, to be held at Bournemouth, from July 24 to 29, 1922.

NOTICES.

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